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Northern Rhodesia

Department of Agriculture

ANNUAL REPORT
for the Year
1950

Price: 1s.

25 SEP 1951

1951
PRINTED BY THE GOVERNMENT PRINTER
LUSAKA

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STAFF LIST AT 31st DECEMBER, 1950

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J. C. Eyre, Director.
M. Halcrow, O.B.E., Deputy Director.
N. M. W. Irvin, Clerk.
E. E. K. Beukes, Clerk.
Miss G. M. N. Briggs, Stenographer.
Miss S. M. Michie, Clerk.
Miss A. M. Taylor, Stenographer.
Mrs. F. E. Gourdie, Clerk.
Miss B. Davis, Clerk.

Special Services.

C. G. Trapnell, O.B.E., Ecologist (Seconded E.A.A. and F.R.O.).
E. Pawson, Soil Chemist, Ndola.
J. C. Collins, Tobacco Adviser, Lusaka.

Conservation Section.

J. N. Clothier, Chief Conservation Officer, Lusaka.
A. N. Beaumont, Conservation Officer, Lusaka.
J. T. Anderson, Senior Mechanical Superintendent, Lusaka.
D. H. M. Naismith, Mechanical Supervisor, Lusaka.
P. E. Maitin, Conservation Officer, Broken Hill.
J. J. Ansbro, Mechanical Supervisor, Broken Hill.
P. G. Jones, Agricultural Supervisor, Mazabuka.
D. F. Locke, Mechanical Supervisor, Mazabuka.

Barotse Province.

D. U. Peters, Agricultural Officer, Mongu.
J. H. Alder, Agricultural Supervisor, Mongu.

Western Province.

C. J. M. Krige, Senior Agricultural Officer, Ndola.
A. T. Wilson, Agricultural Officer, Fort Rosebery.
R. J. Hart, M.B.E., Senior Agricultural Supervisor, Kambowa.
P. McCulloch, Agricultural Supervisor, Ndola.
G. W. E. Pickworth, Agricultural Supervisor, Kawambwa.
P. P. Buchanan, Agricultural Supervisor, Kabompo.

Central Province.

U. J. Moffat, O.B.E., Senior Agricultural Officer, Broken Hill.
D. C. Thornton-Dibb, Agricultural Supervisor, Broken Hill.
W. V. Morony, Agricultural Supervisor, Mumbwa.
R. H. Howard, Senior Agricultural Supervisor, Serenje.
A. D. McLeod, Agricultural Supervisor, Serenje.
R. B. Symington, Agricultural Officer, Feira.
H. H. Roberts, Agricultural Officer, Chalimbana Government Farm, Lusaka.
J. W. H. Rowlands, Agricultural Supervisor, Chalimbana Government Farm, Lusaka.
H. W. P. Nupen, Farm Manager, Mumbwa Pilot Groundnut Scheme, Mumbwa.
J. M. Robertson, Agricultural Supervisor, Mumbwa Pilot Groundnut Scheme, Mumbwa.
J. R. Duckworth, Agricultural Supervisor, Mount Mankolo Research Station, Lusaka.

Southern Province.

R. H. Fraser, Senior Agricultural Officer, Choma.
W. J. D. Watson, Agricultural Supervisor, Choma.
O. J. Gray, Agricultural Supervisor, Namwala.
B. J. O'N. Shepherd, Agricultural Supervisor, Kanchomba.
C. S. Mitchell, Agricultural Supervisor, Magoye.
J. M. Frew, Agricultural Supervisor, Mapangazia.
R. B. Reid, Agricultural Officer, Mazabuka.
C. J. Peycke, Agricultural Supervisor, Monze Agricultural Training School.
T. L. Packer, Agricultural Supervisor, Monze.
G. J. J. van Rensburg, Agricultural Supervisor, Monze.

Eastern Province.

C. E. Johnson, Agricultural Officer, Fort Jameson.
J. Meade, Clerk, Fort Jameson.
A. Carr, Agricultural Supervisor, Fort Jameson.
Mrs. F. Henderson, Clerk, Fort Jameson.
J. H. Rhodes, Agricultural Officer, Lundazi.
B. L. V. Wright, Agricultural Supervisor, Petauke.
W. A. Masters, Agricultural Supervisor, Msekera.
Mrs. E. Gabriel, Agricultural Supervisor, Kalichero.
W. A. Denchfield, Agricultural Supervisor, Chadiza.
P. F. Freeman, Agricultural Supervisor, Katete Agricultural Training School.
D. F. Wallace, Agricultural Supervisor, Katete.

Northern Province.

J. R. E. Hindson, Senior Agricultural Officer, Kasama.
I. L. Edwards, Agricultural Supervisor, Kasama.
B. C. Wills, Agricultural Officer, Lunzuwa.
T. J. Greatrex, Agricultural Supervisor, Lunzuwa.
E. R. Woollard, Agricultural Supervisor, Lunzuwa Agricultural Training School.

On Leave.

J. A. Allan, Agricultural Officer.
J. D. Yelf, Agricultural Officer.
E. G. Dabinett, Agricultural Supervisor.

Department of Agriculture

ANNUAL REPORT FOR THE YEAR 1950

PART I.—AGRICULTURE IN THE TERRITORY.

INTRODUCTION.

On the whole, the 1949–50 season was good. Rainfall was generally above average and consequently food crops, and maize particularly, yielded good harvests. The European and African maize crops produced in the controlled areas were records. The season was very favourable for rice production, and this crop which is being planted on a rapidly increasing scale is becoming a crop of major importance in some areas. The production of groundnuts and pulses was disappointing. There was a substantial expansion of the area planted with cassava but in some areas this was at the expense of grain production. Although the out-turn of flue-cured Virginia tobacco disappointed some farmers, nevertheless the total crop was a record for the Territory.

2. The start of the 1950–51 season was later than usual and planting was generally delayed until late November and December, especially in the Southern Province. However, the weather improved and by the close of the year prospects were generally favourable for food crops if not altogether for tobacco.

3. The harvesting of the record crop of maize in the European areas brought into relief the serious labour shortage that exists at the peak demand at reaping time. The crop was safely gathered in but it was a salutary reminder that despite the enormous strides that have been made in mechanisation, man-power may well be the main limiting factor in the expansion of arable farming in this country.

4. The number of farms and European farmers has continued to increase; in 1949 there were 720 European farmers and in 1950 the number had increased to 950.

5. During the year the Natural Resources Board was established under the provisions of the Natural Resources Ordinance (1949). The first matters to which attention was given were the stimulation of interest in soil and water conservation, the formation of intensive conservation areas by European farmers and the provision of loans on favourable terms for the construction of conservation works. There was no lack of interest on the part of the European farming community, but it is clear that most farmers will expect assistance in the form of Government loans to meet the cost of major conservation works.

6. The three self-contained conservation units, which are fully mechanised for dam construction, contour terracing and bush clearing, started operations in three areas and have a full programme of work arranged for the year 1951. In the European areas thirty-seven miles of terraces were constructed and many more miles were pegged for construction by farmers themselves, while in Native Reserves 4,950 miles of contour ridges and contour grass strips were pegged by the extension staff. Nine dams, with a total capacity of 228 million gallons, and many small buffer dams were constructed in the European areas by the conservation section of the Department.

Maize.

7. The crop was a record for the Territory. For the first time for many years the production of maize was up to local requirements, indeed 16,976 bags were exported. The area planted to maize was a record both in native and non-native areas. In the European farming areas, immigration and increasing mechanisation have contributed to greatly increased planting.

ACREAGE PLANTED TO MAIZE ON EUROPEAN FARMS.

Season	*Acreage*	*Estimated bags reaped*	*Estimated bags per acre reaped*
1946-47	55,889	281,368	5.0
1947-48	65,800	435,000	6.6
1948-49	74,040	370,500	5.0
1949-50	105,000	572,000	5.4
1950-51	100,374	for harvesting in 1951	

It can be seen from the above table that the average yield per acre is not good, which would appear to indicate the necessity for more research and more extension work.

The acreage planted to maize by the European farmers in the 1950-51 season shows a reduction after substantial increases in acreage in each of the last four years. This reduction is attributed to a more than usually difficult planting season and to farmers diverting their activities and available labour to tobacco production where soil conditions permit since tobacco is so profitable at present prices.

8. The utilisation of fertilisers for maize production on European farms leaves much to be desired; 3,511 tons of maize fertilisers, mainly superphosphate, were imported in 1950 and the average quantity used on maize on European farms was calculated to be about 70 lb. fertiliser per acre. Similarly, the investigations of the Agricultural Economist showed that out of every 100 acres of land cultivated for

maize production sixty acres were planted to maize, twenty-seven acres were planted to green manure crops for ploughing in, and the remainder was planted to a crop for harvesting seed or hay. In the Maize Control Board scheduled areas the African farmers increased the area planted to maize and it is gratifying to be able to record that the cultivators are showing a rapidly increasing interest in joining the Improved Farmers' Scheme and many more are in fact improving their methods by contour ploughing and using manure although they have not fulfilled all the conditions laid down for improved farmers. As indicated in last year's report deliveries of native maize to the Maize Control Board are subject to violent fluctuations according to seasonal conditions: the record quantity of maize sold this year as compared with last year bears out this point.

MAIZE PRODUCTION FOR SALE IN THE RAILWAY BELT FOR THE CALENDAR YEARS.

(Thousands of bags of 200 lb.)

Year	*European grown*	*African grown*	*Total*
1944	212	115	327
1945	273	202	475
1946	268	172	440
1947	190	54	244
1948	343	296	639
1949	283	61	344
1950	447	344	791

9. Maize production in other areas, which normally is quite insignificant except for the Eastern Province, was greater than usual, but figures are not available except in respect of the Eastern Province.

MAIZE PRODUCTION FOR SALE IN THE EASTERN PROVINCE.

(Bags of 200 lb.)

1949	31,000 bags
1950	42,000 bags

There are good reasons for believing that some maize was sold across the border in Nyasaland where the price to the producer was over fifty per cent. higher. Appreciable quantities of maize were simply withheld from the market.

10. The price paid for maize delivered to line-of-rail depots in the Maize Control Board area was 30*s*. 2*d*. per bag (200 lb.), i.e. an increase of 3*s*. 2*d*. over last year's price. The prices during the past three years were as follows:

1948 ... ... 25*s*. 8*d*. per 200 lb. bag *in*cluding cost of the bag.
1949 ... ... 27*s*. 0*d*. per 200 lb. bag *ex*cluding cost of the bag.
1950 ... ... 30*s*. 2*d*. per 200 lb. bag *ex*cluding cost of the bag.

European producers received the full price for maize delivered to the line-of-rail depots and the cash price to African producers was fixed at 21*s*. 3*d*. per 200 lb. maize (excluding the cost of the bag) at all buying points within the Maize Control Board area. The difference between the cash payment to African producers and the full price is paid into the African Farmers' Improvement Fund after transport and buying charges have been met. Towards the end of the buying season, and in response to complaints, regulations were made under the Control of Supplies Ordinance to enable action to be taken against buyers of African maize in the Maize Control Board Area for malpractices in buying and to ensure that the Africans received payment in cash at the promulgated price for their maize.

In the Eastern Province the price of maize paid to producers remained unaltered and they were paid at the rate of 10*s*. 6*d*. per bag of 200 lb. of maize (excluding the cost of the bag) except in Lundazi District where the price was 9*s*. per bag. The price to be paid for maize produced in the 1950–51 season has been increased to 13*s*. 6*d*. per bag to be paid in cash to producers plus 1*s*. 6*d*. per bag to be paid into an African Farming Fund.

Approximately 16,256 bags of maize were imported into the Eastern Province in 1950 from the line of rail.

11. Maize consumption is increasing with the expansion of industry and the development of the country, and although potential production has also been increased by the cultivation of larger acreages the fact is that because of the uncertainty of the rainfall from year to year it cannot be considered that self-sufficiency will be attained until deliveries in good years reach at least one million bags. Further appreciable expansion of the tobacco industry will have an effect on maize deliveries because maize which would otherwise have been delivered to the Maize Control Board will be used by farmers to feed their tobacco labour.

The Maize Control Board estimates that requirements for the Pool year 1950–51 are 721,500 bags. The plans of the Maize Control Board are now well advanced for the construction of central storage in silos in Lusaka, with the most up-to-date equipment, to hold 120,000 bags.

Wheat.

12. The tendency indicated in last year's report has not shown much change: wheat growing has now almost disappeared from the farming programme in this Territory. The recent history of wheat production is as follows:

	Bags of 200 lb. net.
1945	22,150
1946	19,233
1947	5,000
1948	9,000
1949	1,470
1950	3,247

Wheat in this country is a winter crop grown under irrigation, and it is difficult to obtain labour for irrigation work which is unpopular and, moreover, the use of water calls for a good deal more supervision and expense than alternative cash crops. The price offered for wheat, namely 56*s*. per bag, would appear good enough, but the fact remains that it is evidently insufficient inducement for farmers in existing circumstances. This is a great pity because imports of wheat into the Colony in 1950 amounted to nearly 120,000 bags (200 lb.) and consumption is increasing steadily.

Beans and Cowpeas.

13. There is no reliable estimate of the total production of beans (*Phaseolus* sp.) and cowpeas (*Vigna* sp.), but there is no doubt that production of beans falls very far short of the local market requirements. At the same time, because the Mines will not accept cowpeas for rations, there was an export of cowpeas and appreciable quantities were sold to local dairy farmers. The Mines required to import some 500 tons of beans from Tanganyika Territory and elsewhere during the year. The season was evidently too wet in many places for satisfactory growth of beans and as a result this, together with rather short planting due to scarcity of seed, undoubtedly depressed the supply available for sale. The Department of Agriculture has taken steps to encourage the planting of more beans and other pulses in suitable areas and especially in the Northern Province.

Groundnuts.

14. The crop produced in 1950 was extremely small due to the relatively low price offered—£35 per ton (shelled) and a shortage of seed resulting from the very poor season in 1949. A price of £45 per ton has been fixed for the 1950–51 crop and there are satisfactory arrangements to enable farmers to dispose of the crop in the shell. The increased price should be some encouragement to greater interest in this very valuable crop. It is hoped, therefore, that 1951 will see some indication of the possibility of closing the enormous gap between local production, which is small at present, and the present potential requirements of some 12,000 tons of kernels.

Cotton.

15. Although the actual production of cotton is still insignificant, progress has been made and the present position justifies the hope that a small but permanent cotton-growing industry is being established in the Luangwa Valley in the Eastern Province. Production was estimated as follows:

	lb. Seed Cotton
1949	7,800
1950	31,000

There were 300 growers in the Luangwa Valley and they received 4½*d*. per lb. seed cotton plus a bonus to members of the Co-operative; 500 growers planted cotton in this area in the 1950–51 season. Some interest has been shown in the possibility of cotton as a rotation crop in the Western area and fifteen European planters planted acreages of up to 100 acres each. Small trial plots have been planted in the Gwembe Valley and on agricultural stations.

The value of cotton seed as a valuable constituent in the rations of dairy cows has not been overlooked: on the contrary it is one reason why efforts are being made to encourage cotton-growing in suitable areas.

Rice.

16. Apart from tobacco and maize, perhaps the most significant advance in agricultural expansion has been the production of rice which is almost entirely African-grown. From very small beginnings, for example, the issue of a bag of seed here or a few pounds of seed to a cultivator or a school garden there, and a good deal of extension work, rice is now coming on the market from widely scattered areas, including the Luapula–Bangweulu area, the Eastern Province, Barotseland, and the Lukanga Swamp area. The total production for sale in 1950 has been estimated at between 3,500 and 5,000 bags of hulled rice. More accurate figures will be available in years to come when the marketing of the crop becomes more highly organised. The quality of some of the local rice compares unfavourably with the present supplies of high-grade imported rice. Arrangements were made to obtain small machine hullers which will be used in the principal rice-growing areas, and inferior varieties are being eliminated. Locally grown hulled rice was marketed wholesale at 6*d*. to 7*d*. per pound. If present progress is maintained it is probable that rice will very soon become an export crop.

Potatoes and Onions.

17. The " hardy annual " problems of severe shortages of potatoes and imports of large quantities of potatoes from South Africa in December to February are being overcome. It is usually during December to February that any surplus crop is available from the Union of South Africa and at the same time it is a period of peak production locally. In 1950 the problem arose in November, rather earlier than usual. The farmers, through the Northern Rhodesia Farmers' Union, approached Government for assistance in the form of protection and organised marketing. Government agreed

to concede a limited measure of protection on a purely temporary basis conditional on the farmers themselves getting together and putting forward constructive suggestions for the orderly marketing of the crop. A representative committee of farmers was set up and negotiations have been started towards the formation of a co-operative organisation on a territorial basis to deal specifically with potatoes and onions.

Some improvement in local supplies in recent years must in a large measure be attributed to the availability and use of better quality seed.

Tobacco: Eastern Area.

18. Despite the increased planting, the 1949–50 flue-cured tobacco crop in the Eastern area was lower than in the previous year because of the relatively very wet season and the dull weather during January.

At Fort Jameson a total of 3,214,516 lb. of flue-cured was sold over the auction floors for an average price of 40.453*d.* per lb. Tobacco for the South African duty-free quota amounted to 372,319 lb. and realised an average price of 64.206*d.* per lb. Non-quota tobacco amounting to 2,842,197 lb. sold at an average price of 37.341*d.* per lb. There were 163 registered growers as compared with 144 in the previous year. There is some doubt as to the exact acreage planted: planters' estimates amounted to 11,000 acres but this was probably much too high. It is clear, however, that the average out-turn of leaf was very low. The standard of cultivation and management on the whole left much to be desired though there were exceptions. Diseases took a heavy toll. Grading and handling were mainly poor but presentation of the bales showed some improvement.

19. There was an appreciable increase in the quantity of Burley tobacco sold over the tobacco auction floors at Fort Jameson; a total of 327,114 lb. of leaf was sold at an average price of 26.694*d.* per lb. Comparative figures for the 1949 sales season are 178,767 lb. of leaf at an average price of 30.198*d.* per lb. Most of the leaf was produced by African growers in Petauke District, who marketed their crop through the Petauke African Tobacco Growers' Co-operative Society and the Petauke Co-operative Marketing Union. In the Luangwa Valley, production amounted to 6,000 lb. Some Burley leaf was produced on European estates but it was generally of inferior quality and realised lower prices.

Tobacco: Western Area.

20. A record crop of 2,956,545 lb. of flue-cured Virginia leaf was produced in the Western Area. The number of registered growers has increased from seventy-eight in 1949 to 113 in 1950 and to more than 250 in 1951. The number of registered growers of Turkish tobacco was forty-eight in 1950. Production of Turkish-type tobacco amounted to 115,330 lb. No Burley or air-cured Virginia leaf was grown in the Western area.

Tobacco Production.

21. The rapid expansion which has occurred in the tobacco industry of Northern Rhodesia is shown in the table below:

PRODUCTION
(in lb. weight).

Season	*Flue-cured Virginia*			*Other Virginia*	*Burley*	*Turkish*		*Total all Types*
	E.A.	*W.A.*	*Total*	*(a)*	*(a)*	*E.A.*	*W.A.*	
1943–44 ...	2,058,000	240,000	2,298,000	†	54,000	†	80,000	2,432,000*
1944–45 ...	2,207,000	243,000	2,450,000	31,000	85,000	20,000	403,000	2,989,000
1945–46 ...	2,823,000	307,000	3,130,000	43,000	77,000	28,000	1,000,000	4,278,000
1946–47 ...	2,928,600	500,000	3,428,600	82,000	125,000	26,500	1,000,000	4,662,100
1947–48 ...	2,988,000	781,500	3,769,500	†	140,000	—	585,590	4,495,090*
1948–49 ...	4,076,300	1,691,600	5,767,900	†	178,800	—	97,000	6,043,700*
1949–50 ...	3,214,500	2,956,500	6,171,000	42,500	327,100	—	115,330	6,655,930

NOTE.—(*a*)=Production confined to Eastern Area.
E.A.=Eastern Area.
W.A.=Western Area.
†=not obtainable.
*=incomplete.

Locusts.

22. The Territory was free from visitations of the Red Locust (*Nomadacris septemfasciata*) during the year.

PART II.—POLICY AND THE WORK OF THE DEPARTMENT.

General.

23. The policy of the Department remained unchanged. The first and foremost task was to promote agricultural development and improvements including soil and water conservation, aimed at making the Territory more self-sufficient in food. It was a source of satisfaction that maize production did, in fact, exceed consumption for the first time for some years. But this achievement was not without its worrying features. There is no doubt that many non-native and native growers in line-of-rail areas are paying little or no attention to the conservation of soil and fertility. In the

non-native areas for example, the area under green manure is only a fraction of what is should be to maintain fertility. The system of " share-cropping " in European farm-lands is extending at an increasing rate, and unless sound methods of cultivation are followed this system will be most detrimental to the food-producing lands. It is evident that some of the new settlers have insufficient capital to farm the land as it should be farmed. In the African areas insufficient European and African agricultural staff has hampered the progress of the African Improved Farmers' Scheme which would go a long way towards keeping the native maize areas in good heart.

24. The Department is encouraging tobacco growers to diversify their farming activities, especially in the direction of mixed farming, with cattle and possibly groundnuts as alternatives, and in this way to make for some stability in the industry. At the same time the aim has been to improve the efficiency of tobacco planting in respect of yield per acre and quality. The fact is, however, that the rush—almost like a " gold rush "—of newcomers into tobacco-growing in Northern Rhodesia has inevitably included many people who lacked experience and were too anxious to plant larger acreages than they can properly manage or for which they have adequate labour.

25. The development of a more balanced agriculture was rendered more difficult by the degree of unbalance in the returns obtainable for different crops. Obviously the production of tobacco and, to a lesser extent, maize were relatively more attractive than the production of other agricultural commodities. However, some improvement has been brought about through price adjustments, for example, the price of groundnuts will be £45 per ton in 1951 as compared with only £35 in 1950. The prices of dairy products too have been improved. The position should therefore become easier in regard to the development of mixed farming.

26. In many native areas a serious problem was the scarcity of man-power for agricultural production in the villages. In many districts there are very few villages in which there is not a very high proportion of the male population away at work on the Copperbelt and elsewhere, leaving the women and children to fend for themselves in the reserves. In effect, the men-deserted villages become depressed areas and more liable to food shortages than ever. This is particularly the case in the areas where finger millet is grown as the staple food, because it is the man's work to cut the trees to burn for the gardens.

27. A serious handicap in improving agriculture in the native areas was the lack of knowledge of the processes involved in maintaining soil fertility under local conditions, particularly on the *Brachystegia-Isoberlinia* soils. In trying to evolve systems of permanent agriculture to replace shifting cultivation we are constantly faced with problems to which reliable answers can be found only from the results of research and experiments. Until the attention of suitably qualified scientists can be brought to bear on these problems, progress must be slow, particularly in the *Brachystegia-Isoberlinia* areas, which comprise a vast area of the Territory.

Staff.

28. Mr. J. C. Eyre (Deputy Director) was appointed Director in place of Mr. E. F. Martin who retired from Government service during the year.

Mr. M. Halcrow, O.B.E. (on transfer from Barbados) was appointed Deputy Director in place of Mr. Eyre.

Mr. J. N. Clothier (Senior Agricultural Officer) was appointed Chief Conservation Officer.

The staff was increased during 1950 by one Agricultural Officer, two Conservation Officers, one Farm Manager for the Pilot Groundnut Scheme and seven Agricultural Supervisors.

Against this, however, must be recorded the loss of Mr. C. G. Trapnell, O.B.E. (Ecologist), on secondment to the East African Agricultural and Forestry Research Organisation, and four Agricultural Supervisors—two of whom resigned and two transferred.

Increases in the African staff, mainly in the ungraded scales, were made and, towards the latter part of the year, the first output of successful students from the Monze Agricultural Training School took place, resulting in a very welcome increase in the number of trained African staff of the Department.

The most serious aspect of the staff position is the lack of Agricultural Officers and Research Officers.

The Pilot Groundnut Scheme.

29. The scheme is very small compared with similar schemes elsewhere, being restricted to a maximum area of 1,200 acres for the main operations plus 200 acres for trials. The intention is to test the possibilities of mixed farming based on relatively intensive beef production with groundnuts as the main cash crop. When the scheme is in full operation the area under groundnuts will be 400 acres, of which half will be first-year and half will be second-year planting. A maximum of 200 acres of other crops including maize, kaffir-corn and beans will be cultivated. The balance of the area, i.e. half—600 acres, will be under temporary grass leys for mowing and grazing.

Work was begun in January, 1950. In January, 1951, 530 acres had been cleared by mechanical means, of whic h 420 acres were planted with groundnuts and seventy-five acres with maize. Ninety-five head of breeding cattle from Southern Rhodesia have been obtained and the construction of dipping facilities and fencing were in hand. A manager's house, African staff houses and a labourers' compound and farm buildings were nearly completed. All the equipment required for mechanised production of groundnuts was on the scheme, but it remains to be seen how far it will be successful under local conditions, and to what extent mechanisation will have to be supplemented or replaced by hand labour.

The 530 acres cleared mechanically cost £7,200 including windrowing, ripping, levelling anthills and roughly grading roads. Most of the work was done during the dry season, generally by units under training on D7 tractors with bulldozers, and it must be admitted that the quality of the work was evident at planting time when stumps and roots caused endless difficulty and damage to equipment. In future, if labour is available, the balance of the area will be cleared by hand which is much cheaper and more satisfactory—that is, provided the labour is available.

Conservation.

30. A report on the Conservation Service is contained in an Appendix to this Report and it will be noted that in the European areas soil and water conservation work was accelerated by three conservation units which started work in the latter half of the year, one in the Broken Hill–Chisamba area, one in the Lusaka area and the third in the Mazabuka area. At present the tractors include one Caterpillar D8, four D7 and two Caterpillar D6 tractors complete with all necessary equipment for making dams, contour ridges and other conservation works. Bush clearing using the D8 tractor and equipment has been included in the scope of the work. The units experienced not unexpected troubles when the work started, but they finished the year well established and with a full programme of work ahead. It is proposed to increase the units up to five within the next two years.

31. Although the work was begun rather late in the year, 2,180 acres of agricultural land were protected by conservation works and a further 3,500 acres were pegged; nine dams with a total capacity of 228 million gallons were completed and 488 acres of bush were cleared. The charges for work done have been calculated to cover running costs and overheads so that the scheme will be self-supporting. Arrangements were made to provide farmers with loans on reasonable terms to meet the cost of conservation works and for the granting of subsidies on the cost of constructing dams and weirs which would not yield a fully economic return to the farmer.

32. In addition to the foregoing, a good deal of soil conservation work on non-native farms has been done, notably in the Eastern Province, where 1,700 acres of cultivated land were protected by contour ridges, and in the Southern Province; this was supervised by Agricultural Officers and Supervisors not directly associated with the conservation units.

33. In the native areas soil conservation has continued to play a big part in our work throughout the Territory. In the Eastern Province it is estimated that approximately 15,000 miles of contour ridges have been constructed or pegged out during the past four years; the conversion from mound cultivation to contour ridges was extended to a further 350 villages during the year. It is estimated that nearly half the arable land in native occupation in the Eastern Province is now protected by contour ridges. The keynote here is that although this is progress, contour ridges alone are not enough. What is required is a permanent system of contour farming that will raise the fertility of the soil and thus result in a better and indeed a rising standard of living for the people. A question of fundamental importance is whether the African system of a bush fallow rotation on light sandveld soils can be replaced by a more permanent system without the use of artificial fertilisers and whether the Africans can grow crops which will meet the cost of fertilisers. European tobacco planters cultivating the same soils practise a form of agriculture which might be described as "shifting hydroponics." It is a sobering thought that the Provincial Agricultural Officer has put into the following words:

> "Because of the prevalence of shifting cultivation, the mere maintenance of this acreage under contours calls for demarcation of possible 30,000 acres every year."

34. In the Southern Province recently, soil conservation works have taken the form of contour grass strips which have proved quite effective in checking erosion on the gentler slopes, especially if contour ploughing and cultivation are practised. Progress during the year was disappointing, however; only some 600 miles of grass strips were demarcated. The Department's preoccupation with the Improved Farmers' Scheme accounts to some extent for the relatively inadequate progress of soil conservation works. Shortage of labour is a contributory factor. The mechanised approach to the problem which was begun towards the end of the year at Mapangazia is giving every indication of being successful.

35. In the Northern Province soil conservation work extended and arrangements have been made to post an Agricultural Supervisor to the Isoka District in order to intensify the work in Chieftainess Wayitwika's area.

36. In the Central Province contouring in native areas by mechanical means has been started at Mumbwa, Kembe and Serenje. In the reserves in the vicinity of Lusaka, hand-made ridges have been introduced by the Agricultural Officer, Chalimbana.

37. In the Western Province and to some extent in the Northern Province contour ridging is not so much in evidence, because most of the people practise the *Chitemene* system, i.e. burning trees on plots and planting finger millet. In these circumstances conservation is largely a matter of controlling grass fires by early burning, which has been and is being rigorously enforced, and in controlling the areas which are cut for burning.

Extension Services.

38. Non-native agricultural advisory services were carried out by the Agricultural Staff at Abercorn, Ndola (including Kambowa), Broken Hill, Lusaka (Chalimbana Wheat Station), Mazabuka, Choma and Fort Jameson. In addition, a Tobacco Adviser based on Lusaka toured regularly visiting tobacco farmers in the Western Area, and, based on Fort Jameson, an Agricultural Supervisor specialising in flue-cured Virginia tobacco did similar work in the Eastern Province. Extension work in non-native farming areas is a branch of the Department's activities that must be increased and improved as soon as staff permits. It is, however, a matter that is bound up with the development of research services for which provision has now been made. A start was made on developing the Kambowa Agricultural Station to meet the increasing need on the Copperbelt for nursery and demonstration facilities for intensive fruit and vegetable growing under irrigation. With the transfer

of the Chief Conservation Officer to Lusaka, the wheat station at Chalimbana in Lusaka District was put in charge of an Agricultural Officer and an Agricultural Supervisor, who will continue to manage the station on a somewhat reduced scale as a demonstration of intensive dairying, artificial pastures and some irrigation. Possibly also, in due course, an artificial insemination centre under the supervision of the Veterinary Department will be located at the station.

39. In the native areas apart from the various conservation measures already mentioned and the *chitemene* control in the Northern Province, the extension services for African agriculture are based on small agricultural stations, some of which have been financed from Development and Welfare funds or in the Maize Control Board areas partly from the Improved African Farming Fund. Nine small agricultural stations recently established under Development and Welfare schemes are located as follows:

Eastern Province: Lundazi, Chadiza.
Central Province: Serenje, Mumbwa.
Western Province: Fort Rosebery, Kawambwa, Kabompo.
Barotseland: Mongu.
Southern Province: Mapangazia.

By the end of the year, there were in all twenty-three agricultural stations, including provincial centres, devoted wholly or in part to developing native agriculture.

40. Particular attention was given to encouraging rice in the Luapula-Bangweulu area, in the Eastern Province and in Barotseland. Groundnuts were encouraged in all suitable areas. In the Northern Province an effort was made to arouse interest in the possibility of increasing the production of beans (*Phaseolus* types) to meet the demand on the Copperbelt; at present, hundreds of tons of beans have to be imported from Tanganyika and elsewhere. The encouragement of cotton-growing in the Luangwa Valley was intensified. In connection with the possibility of developing a small palm oil industry in the Luapula area, a nursery of selected seed imported from Nigeria was established near Kawambwa. A great deal of extension work was done in connection with peasant farming schemes and the Improved African Farming Scheme, which require special mention.

Peasant Farming Schemes.

41. The idea behind these schemes is to try to establish permanent African farming communities on a tenant-farming basis, the Native Authority being the landlord, under the enlightened supervision of the Provincial Administration and the Agricultural Department. On the whole, where agricultural conditions are good the scheme has given encouraging results so far. Three years, however, is not a long enough period on which to judge the full results. Nevertheless there is enough evidence to justify extending the scheme wherever agricultural conditions permit. The old adage, " You can't make a silk purse out of a sow's ear ", is very true in regard to planning peasant farming schemes. It has been clearly demonstrated that it is absolutely essential to ensure that a peasant farming group has good soil and other advantages for a start.

42. Groups have been started at three centres in the Eastern Province, at three centres in the Northern Province and at five centres in the Central Province, bringing the total number of groups to eleven in all, comprising some seventy peasant farmers. Sites have been selected for further blocks of farms to be started in 1951. It is interesting to note that on the earliest block started at Kawaza in the Eastern Province nearly four years ago, repayment of the loans, which amount to about £100 per farm, has been so good that the farmers are expected to repay the whole amount in six or seven years only.

Improved African Farming Scheme.

43. This scheme is financed from the Improved Farming Fund which is derived from the annual balances on the Native Maize Pool operated by the Maize Control Board. The fund is administered by a representative committee of which the Director of Agriculture is chairman. The funds are only used in the Maize Control Board areas; hence the scheme is restricted to certain areas of the Southern and Central Provinces.

44. A bonus is paid to those African farmers who carry out the recommendations of the Department of Agriculture which are designed to improve the standard of African farming and put it on a permanent basis. Provision was made for three classes of improved farmers. The first-class farmer has to divide his arable land into four fields—approximately quarters. In one quarter he is required to use farmyard manure before planting maize: a second quarter has to receive 150 lb. per acre of superphosphate before planting maize: a third quarter is planted with sunnhemp for ploughing-in as a green manure: the fourth quarter is used for groundnuts or beans or cowpeas. In short, the rotation is green manure (legume) ploughed-in, followed by maize fertilised with superphosphate, followed by a pulse crop, followed by maize manured with farmyard manure. The bonus paid to a first-class improved farmer was 18*s*. per acre of arable land cultivated. The second-class called for a similar division of the land but without the use of artificial fertiliser and the sunnhemp could be replaced by a leguminous cash crop. The bonus for a second-class improved farmer was 9*s*. per acre of arable land cultivated. A smallholder class was open to farmers with less than ten acres of land: smallholders could plant up to three-quarters of their land with maize, of which two quarters must receive eight cart-loads of farmyard manure per acre plus 150 lb. per acre of superphosphate fertiliser, the remaining quarter being under a pulse crop. The bonus for a smallholder was 18*s*. per acre.

44. During the 1949-50 season, 158 first-class and 104 second-class improved farmers qualified for bonuses and the total sum paid out to them was £3,480 15*s*. The relatively small number of farmers was to some extent due to the tightening-up of the conditions in the previous year. However, the people have now realised the benefit of the scheme, and between 500 and 600 have registered under the scheme for the 1950–51 season throughout the Southern and Central Provinces.

45. The fund was administered so as to provide other services for native cultivators in the controlled areas. For example, an interest-bearing loan of up to £10,000 has been put at the disposal of the Registrar of Co-operative Societies to finance the bulk purchase of fertilisers and farm requisites including ox carts. In addition, twenty-five ox carts were subsidised in the form of a free grant of approximately one-third of the cost to bona fide native farmers, not necessarily " improved " farmers. Funds were spent directly on soil conservation services, land messengers and village roads. The total expenditure was approximately £20,000 during the year.

46. At the end of the 1950 harvest, an endeavour was made to compare the yield of maize per acre on improved farms with the average. Fifty-two peasants in four areas were picked more or less at random, twenty-six were improved farmers and twenty-six were average cultivators. The results of this survey were as follows:

Improved farmers' average yield of maize: Seven bags per acre.
Ordinary farmers' average yield of maize: Three bags per acre.

Agricultural Education.

47. Three African Agricultural Training Schools have been established through Development funds, including Colonial Development and Welfare grants. The Monze school was completed in 1949, the Lunzuwa school at the end of 1950, and the Katete school was under construction and due to be completed in 1951.

48. At Monze the first batch of pupils who began in 1949 completed the eighteen months' course in October, 1950. The successful graduates, eighteen in all, were appointed in the Department as African Agricultural Assistants. The number of graduates will be greater in 1951. Fifty-five students were in residence at Monze at the end of the year. At Lunzuwa the first class began in November, 1950, with twenty-one pupils, all full of enthusiasm.

Building has been slow at Katete due to lack of materials and labour. Also there has been difficulty in obtaining suitable standard VI applicants for training there. Eleven pupils started the first course in May and a further twelve started the second course in November. The position may improve, however, when the school is completed.

49. It has been arranged that four places will be available at each school every year for teachers sent from the Department of African Education, for training in agriculture.

50. On the non-native side, two European trainees were accommodated at the Choma Tobacco Experiment Station to learn tobacco-growing under the supervision of the Senior Agricultural Officer in charge of the station.

51. Through arrangements made between the Governments concerned, three Northern Rhodesian students were admitted to the two-years' Diploma Course at the College of Agriculture, Gwebi, in Southern Rhodesia, which began on 1st February, 1950; three more applicants were selected for entry in February, 1951.

Research Services.

52. A comprehensive Research Scheme for the Territory was revised and re-submitted to the Secretary of State early in the year for approval under the Colonial Development and Welfare Act. Approval was granted towards the end of the year, and a start was made by acquiring a site for the Central Research Station. The Government of Northern Rhodesia provided funds and purchased a farm of 2,800 acres at Mount Mankolo, ten miles south of Lusaka on the main north-south road. The scheme provides for a Central Research Station at a capital cost of £77,044 and three research substations at a further capital cost of £48,928. One hundred per cent. of this capital cost has been accepted against Colonial Development and Welfare funds. The total recurrent cost of the scheme has been estimated at £165,000 over six years, of which fifty per cent. will be payable under the Colonial Development and Welfare Act, leaving fifty per cent. to be paid from Northern Rhodesian funds.

53. It is the intention that 1,000 acres of the farm will be used as a training centre for European farmers. Apart from essential maintenance, including a conservation plan of the farm, further development of the Central Research Station and the scheme as a whole must await the appointment of a Chief Research Officer and the other specialist officers.

EXPERIMENTAL WORK.

Msekera, Fort Jameson District, Eastern Province.

54. A soil fumigant injected into seed-beds at a rate of 3 c.c. per square foot three weeks before planting, eliminated eelworm damage as far as could be observed. In a tobacco rotation experiment tobacco looked very much better on land that had been planted for three years with a local grass (*Hyperrhenia* sp.) than under a bush fallow. Eelworm infestation, which varies from ten per cent. to sixty per cent., vitiates much of the value of experimental work with tobacco on a field scale at this station.

Petauke, Petauke District, Eastern Province.

55. Spacing trials with Burley tobacco over a period of years have established that a spacing of 3 ft. 6 in. by 2 ft. is most satisfactory for yield and quality under local conditions. A new variety called " Barnet Special " gave the highest yield and a satisfactory quality, in a variety trial that included the standard local variety, " White Burley ".

56. An experiment has been continued for six successive years to compare contour ridge cultivation with unprotected mound cultivation. Maize planted on the contour every year and interplanted with groundnuts has yielded on an average over the past four years two bags per acre more than maize planted on the mounds, i.e. in fact, an increase of fifty per cent. due to the beneficial effect of contour ridging. A similar experiment on poor sandy plateau soil at Katete over the past six years has failed to show any increase in yields through contour ridging. So far all attempts to demonstrate practical ways of increasing the productivity of these very poor soils have been inconclusive. This, however, is not surprising since the problem is widespread throughout Africa.

Lunzuwa, Abercorn District, Northern Province.

57. Of five varieties of velvet beans two, namely Nos. 93 and 68 from Ukiriguru, Tanganyika, proved outstanding. Local selections of kaffir-corn were found to be better than imported varieties. It is interesting to note that " Yellow Sahara " maize has done better than white maize and that the local African cultivators seem to like the yellow variety. A sweet " Congo " type of cassava gave a remarkably high yield of 12,400 lb. per acre of dried pounded roots after two years' growth at the Ntatumbila Seed Farm. The cost of producing finger millet under *chitemene* (burnt garden) conditions, costing labour at local rates of pay, was 17*s*. per bag (200 lb.) at Lunzuwa.

58. In an experiment on the effects of early and late burning, it was noticeable that the grass *Themeda triandra* has become the dominant species in the late burnt plots after eight years' treatment, which seems to indicate that controlled late burning is a cheap and efficient method of pasture management in the Abercorn District.

Chalimbana, Lusaka District, Central Province.

59. Trials of different species of grasses for grass leys have shown *Panicum makarikariensis* to be the most promising so far. Rhodes grass was patchy and star grass (*Cynodon plectostachyum*) was a failure. Overhead irrigation of grass leys and lucerne during the dry season was disappointing.

60. In a trial of eighteen varieties of wheat under irrigation the following six varieties were not badly affected by rust and all yielded more than 1,000 lb. per acre:

Punjab 8A; Sabanero; Mentana; Bearded Kruger; Karachi; and Matopo.

Birds did a great deal of damage and indeed the more susceptible varieties of wheat were practically eaten off by birds, in spite of measures to scare them away.

61. Five varieties of oats were grown: Lampton yielded more than nine bags per acre; and Ajax, Beaver, Beacon and Gerry all yielded more than eight bags per acre.

Kambowa, Ndola District, Western Province.

62. At Kambowa Agricultural Station on a deep orange sandy Northern Plateau soil, a fertiliser trial on maize indicated that nitrogen was the limiting factor and that response to phosphatic fertiliser was conditioned by the level of available nitrogen.

Namushakende, Barotseland.

63. Trials were carried out with a wide range of new crops and varieties of existing crops, under the different conditions obtaining locally. This work will have to be maintained for some years before the results can be applied, but it is already evident, for example, that the rice variety, Angola Crystal, is most promising and that on the moist clay loam soil (*Sitapa*) several varieties of wheat can be successfully grown.

Hybrid Maize Trials.

64. A number of trials were carried out at different centres to compare Southern Rhodesian Double Hybrid maize with locally selected Hickory King. In general the Double Hybrid maize gave the higher yield. The following figures indicate the order of difference:

	Yield in bags (200 lb.) per acre	
Centre	*Double Hybrid*	*Hickory King*
Research Station, Mazabuka	13.6	11.3
Agricultural Station, Monze	12.5	9.0
Agricultural Station, Magoye	10.8	10.1
Agricultural Station, Kanchomba	15.6	7.1
Agricultural School, Monze (on poor soil) ...	5.9	2.8

The following observations were made on the relative merits of the Double Hybrid and the Hickory King:

(*a*) At Mazabuka one bag of 200 lb. seed planted twenty-five acres of Double Hybrid as compared with eighteen acres of Hickory King.

(*b*) At Magoye a test was made to find out whether Hybrid maize takes longer to dry out than Hickory King. Twenty-five readings from five samples of each variety in the first week of August gave the following average moisture determinations:

Double Hybrid: 13.24 per cent.
Hickory King: 12.79 per cent.

(*c*) At Magoye in an examination of the relative resistance to disease, the extent of disease in the grain was found to be very slight—generally nothing more than a brown fleck towards the tips of the grains. On a very severe examination of random samples of grain the position was as follows:

Double Hybrid: 18 per cent. diseased and flecked grains.
Hickory King: 16 per cent. diseased and flecked grains.

Broken Hill.

65. The experimental work undertaken by Messrs. McArthur and Uys in co-operation with the Department was continued.

The results to date may be summarised as follows:

Section (i) An eight-course rotation consisting of two years tobacco, one year groundnuts, one year maize manured and four years grass (three different species).

(*a*) Maize had given 12.5 bags per acre in 1948–49 and 14.7 bags in 1949–50.

(*b*) Groundnuts have been a failure for two successive years.

(*c*) Tobacco in 1949–50 following a grass ley was not very successful, yielding only 350 lb. per acre. This might have been due to excessive rainfall. On the other hand the grass was ploughed rather late and considerable difficulty was experienced in eradicating the star grass, consequently the tobacco was planted late.

(*d*) The three species being tried in the grass leys are *Panicum makarikariensis*, Naivasha Star grass (*Cynodon plectostachyum*), and Giant Rhodes Grass (*Chloris gayana*). All three have done well, with *Panicum* being perhaps the best all round. It remains to be seen whether the star grass will continue to be difficult to plough in and eradicate. Three to four tons per acre of hay have been obtained off the grass leys.

Section (ii) Grass Ley—Fertiliser Trial.
This trial is not yet in full operation until the grass is properly established.

Section (iii) Utilisation of Seepage Areas.
Annual crops have been a failure for four successive years; the drainage has, however, sweetened the land to the extent that *Paspalum dilatatum* grass for grazing has been established without much difficulty and this treatment looks to be a most promising method of utilisation.

Mochipapa Tobacco Station, Choma, Southern Province.

66. In a comparison of seven varieties of Virginian tobacco graded at the station there was practically no difference in the average price received. The lowest average price was paid for the variety C/10 at 44.3*d.* per lb., while the highest average was paid for Willow Leaf at 46.3*d.* per lb. The variety C/7 appeared to compare favourably with the best of the well-tried varieties, and seemed worthy of further investigation.

67. Of seven varieties of Turkish tobacco under trial the Southern Rhodesian variety "Monopoly" did very well and appeared resistant to leaf spot diseases. The most promising of the Balkan varieties was "Soulouk"; it produced the highest proportion of small leaves of excellent quality, was very free from disease and ripened well in the cold weather.

68. Trials of four species of grasses for grass leys have shown that Giant Rhodes Grass planted from seed appears to hold out most promise as a rotation crop with tobacco. Naivasha Star Grass from roots was a good second choice, but suffered in competition with indigenous weed grasses.

69. A mechanical planter of the type used for cabbage plants in the United Kingdom was tried with tobacco seedlings but the results of this preliminary trial were disappointing. It appeared that adjustments are required in the mechanism for tightening the plants into our very sandy soil.

Special Surveys.

70. Oil Palm Possibilities. The Soil Chemist and the Agricultural Officer, Fort Rosebery, made a careful survey of possible areas in the vicinity of Lake Mweru, digging pits and taking soil samples. This survey formed the basis for a selection of sites for oil palm nurseries later in the year.

71. Rice Research Sub-station. A very laborious search has been carried out by the senior officers concerned, on the western, northern, north-eastern and southern shores of the Lake Bangweulu, but the results have been extremely disappointing. The best hope appears to be in the vicinity of Luwingu. However, it remains to complete the survey in the south-eastern sector before a final decision is made.

72. Lundazi District. The Agricultural Officer, in addition to his other duties, made a survey of the agricultural potentialities of this area. Rice and cotton in selected areas are likely to be the most promising cash crops, and demonstration plots of these crops were planted.

73. Possible Large-scale Sugar-cane Areas. Senior officers of the Department, including the Deputy Director and the Soil Chemist, conducted a tour with Mr. P. E. Turner, Sugar Agronomist, British West Indies, with a view to clarifying the position as to the suitability of certain areas for large-scale sugar-cane growing. The Kafue Flats, the Luano Valley and a block of some 20,000 acres on the banks of the Zambezi near Chirundu were surveyed and soil samples taken. The Chirundu site appeared sufficiently encouraging to offer scope for a more detailed investigation.

74. Mwinilunga. The Senior Agricultural Officer and the Soil Chemist spent three weeks investigating the agricultural possibilities of the Mwinilunga area from the point of view of its suitability for European settlement. Their report was most discouraging. The soils are mainly Kalahari sands and the stock-carrying capacity is extremely low.

75. The Feira Problem. For the last quarter of the year an Agricultural Officer was specially seconded to carry out a comprehensive survey of the area concerned. This officer submitted a most detailed report under the guidance of the Senior Agricultural Officer, Central Province. In the upshot it was recommended that the affected population could be resettled in the Luangwa Valley provided certain precautions were taken.

76. MKUSHI BLOCK. The Senior Agricultural Officer, Central Province, completed an extremely important and practical report on the utilisation of the Mkushi Block for European farms. A plan for subdividing the block into about 100 farms of between 3,000 and 5,000 acres each was submitted.

Publicity and Publications.

77. A good deal of agricultural propaganda material was submitted to the Information Department during the year, as follows:

No. of African broadcast talks	29
No. of articles for *Mutende*	13

In particular, considerable publicity was given to the African Improved Farmers' Scheme.

78. The Agricultural Show at Lusaka provided an opportunity for agricultural education and for some modest " window-dressing ". The Department displayed a comprehensive exhibit illustrating the work of the various sections and, if one may judge from the comments of visitors, the work was well worthwhile and much appreciated.

79. The rapid increase in the number of new European farmers, together with the rapidly developing native agriculture, has increased the volume of routine advisory work of the Department to an extent that has brought out the need for pamphlets and bulletins for local use. Accordingly a start was made on a series of Departmental Bulletins covering various aspects of agriculture in Northern Rhodesia. Two bulletins were issued in 1950, as follows:

No. 1 of 1950. Tobacco Root-knot Nematode. Suggested Measures of Control. By J. C. Collins, B.SC. (EDIN.), Tobacco Adviser.

No. 2 of 1950. The Production of Flue-cured Virginia Tobacco in Northern Rhodesia. By Alan Carr, Agricultural Supervisor.

Legislation.

80. No new legislation was passed during 1950 apart from General Notice 1287 of 1950—concerning the importation of tomato fruit, seed and plants from the Union of South Africa.

Visitors.

81. Dr. H. Greene, M.C., PH.D., D.SC., Tropical Soils Adviser, Rothamsted Experimental Station, Harpenden. 12th to 20th May.

Mr. M. N. Harrison, Pasture Research Officer, Sudan Veterinary Department. 10th to 21st May.

Dr. G. Bates, Central African Scientific Liaison Officer, London. 4th to 8th September.

Dr. J. E. V. Phillips (Agronomic Section), Tanganyika Groundnut Scheme. 9th to 10th November.

Mr. P. E. Turner, Sugar Agronomist (British West Indies Development and Welfare Organisation). 16th to 27th November.

Mr. G. W. Nye, O.B.E., Deputy Agricultural Adviser, Colonial Office. 12th to 22nd November.

Farmers' Union.

82. The first Annual Congress of the Northern Rhodesia Farmers' Union was held in Lusaka and was opened by Mr. R. Welensky, C.M.G., J.P., M.L.C. Delegates from all associations attended and debated a wide range of subjects of concern to the European farming industry.

J. C. EYRE,
Director of Agriculture.

11th May, 1951.

APPENDIX

CONSERVATION SERVICE.

Chief Conservation Officer: J. N. CLOTHIER.

During early 1950 there was little work done on account of the absence of the writer on leave and the fact that the Conservation Section was in process of formation, the only machinery to hand being two D6 tractors and an assortment of earth-moving machinery. Time was spent by the Senior Conservation Superintendent in collecting and training coloured and African staff and assembling units.

2. Much delay has been experienced in obtaining suitable European staff, offices, housing and workshop buildings. Despite this, two units were eventually formed and sent out to their individual districts late in 1950.

3. Towards the end of the year a workshop centre was located near Lusaka and every effort is being made to complete the construction and organisation of this essential nucleus, which should be completed within the first quarter of 1951.

Field Operations.

4. The European farming sections of the country have been divided for the purpose of distributing officers and machinery units into five Group Areas:

1. Lusaka–Kafue Group Area.
2. Mazabuka–Monze.
3. Chisamba–Broken Hill.
4. Choma–Kalomo.
5. Fort Jameson.

5. It is planned to have one machinery unit complete with one Conservation Officer and one Mechanical Superintendent in each Group Area. To date, except for machinery not yet to hand, Areas 2 and 3 are in operation. Area 1 has not been fully formed, but due to the pressure of farmers' requests, two D6 tractors have been operating under the direction of a Conservation Officer. This unit should be fully in action in March, 1951. Each unit is designed to tackle farm development work including designed fire guards, roads, fence clearing, bush clearing, land and watershed conservation works and smaller dams. All large water impounding works will naturally be done by the Water Development and Irrigation Department. Units are to date supplied with equipment and tractors to hand, but the eventual design is one D8 tractor and two D7s complete with scrapers, rippers, angle-dozers, one large grader, rome-disc and subsoiling equipment. Transport, camping equipment and other incidentals are also supplied.

No. 2 Unit, 1950—Mazabuka–Monze.

6. This unit is as yet only supplied with two D7 tractors and their necessary equipment. It commenced operations in Mazabuka at the end of October, 1950, and had a very unsettled start, but has now settled down for its 1951 programme.

7. Seven hundred and twenty acres of conservation protection works were completed including contour ridging, storm drains and light buffer dams, totalling 11,100 yards contour ridges and 6,600 yards large cut-off storm drains, plus two small dams with a total capacity of 11,000,000 gallons and some 200 acres of subsoiling. The unit has earned a total of £1,453. A total of 538 hours' work has been returned against a total of 720 possible work hours. In addition the Conservation Officer laid out 2,000 acres of contour ridges and surveyed six dam sites for farmers.

No. 3 Unit, 1950—Chisamba–Broken Hill.

8. This unit commenced work in Chisamba District on 11th August, 1950, with two D7 tractors. A D8 tractor was added at the end of November, but has not been in full operation as the angle-dozer is not yet available.

9. Seven hundred and eighty acres of conservation layout has been completed, totalling 18,150 yards of storm drains and ridges including bulldozing, ripping and levelling. In addition, the unit completed three conservation cushion dams, four dams with a total storage capacity of 181,400,000 gallons, forty acres of bush clearing and irrigation and 320 acres of subsoiling, mostly experimental.

10. The unit has earned a total of £2,950 14*s*. and given a total return of 1,332 tractor hours against a total of 1,600 possible work hours.

11. In addition, some ten dam sites have been surveyed and farm planning and conservation on fifteen farms have received attention in preparation for the 1951 programme.

Lusaka Area.

12. The two D6 tractors have also continued to do intermittent work on the Lusaka farms. Much of this has continued as training for staff under the Conservation Officer.

13. They have put in 26,800 yards of contour ridging over 380 acres of land, and 2,520 yards of storm drains over 300 acres of land.

14. Three small dams have been constructed impounding a total of 35,640,000 gallons of water. A further 200 acres of irrigation land has been laid out, levelled and protected and four small buffer dams constructed.

15. A total of 1,966 hours' work has been done for farmers by these tractors and £4,109 has been earned.

Pilot Groundnut Scheme.

16. The two D7 tractors that later went to Mazabuka were sent to the Pilot Groundnut Scheme on arrival in the country and commenced work at the end of February. They remained there until August.

17. During this period these two machines—
cleared 448 acres of bush in 271 hours, average 1.65 acres per hour;
bush raked 298 acres of bush in 238 hours, average 1.25 acres per hour;
ripped 498 acres of bush in 351 hours, average 1.42 acres per hour.

18. The estimated cost of clearing, raking and ripping varied from £7 1*s*. per acre in medium light bush to £9 6*s*. in medium heavy bush.

19. In addition 200 acres of land were ploughed. 17,700 yards of road was cleared, ripped and very rough graded (weather and soil conditions did not allow the work to be completed) over a total time of 340 hours. To a great extent this unit was in training while doing the road.

20. The machines earned a total of £4,325 over this period and did 1,200 hours' work out of a possible 1,920 work hours.

Totals:

Mazabuka-Monze	538 hours worked out of possible 720 hours.	£1,453 0 0	earned
Chisamba-Broken Hill ...	1,332 hours worked out of possible 1,600 hours.	£2,950 14 0	earned
Pilot Groundnut Scheme	1,200 hours worked out of possible 1,920 hours.	£4,325 0 0	earned
Lusaka area	1,966 hours worked out of possible 2,960 hours.	£4,019 0 0	earned
	5,036 hours worked out of possible 7,200 hours.	£12,747 14 0	earned

21. In 1951 it is estimated that 14,000 hours' work will be done with the existing machinery and that revenue will amount to £40,000.

General.

22. The Conservation Section has also been interested in the development of grass ley work throughout the farming area, and during this year under review considerable quantities of grass have been supplied to farmers throughout the country, the most popular variety being *Panicum makarikariensis*.